Reverse Logistics Adoption among Malaysian Manufacturers

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Abstract**—** This paper presents the descriptive analysis of a study on the reverse logistics adoption among manufacturers in Malaysian. The objective of this paper is to investigate the current state or level of reverse logistics adoption by Malaysian manufacturers, the reverse logistics activities performed and the strategic benefits of adopting reverse logistics. Another focus is on the barriers faced by companies in implementing reverse logistics activities in their operation. Data were collected through survey questionnaires that were distributed via mail, e-mail or self-administered. A total of 101 usable responds were received and analyzed. Findings indicate that reverse logistics activities have been implemented by all respondents but the level of adoption are relatively very low. This lower than average level of adoption can be attributed to the fact that manufacturers are lacking in terms of knowledge and awareness on reverse logistics concept, together with the perception that reverse logistics are expensive and requires huge resources to implement. Discussions on the findings, significance of the study and direction for future research are then discussed.

Keywords**—**Customer Relations, Malaysia, Reverse Logistics, Supply Chain.

I. Introduction

Reverse logistics has been defined as the movement of product or materials in the opposite direction of the supply chain for the purpose of creating or recapturing value, or for proper disposal. It includes processing returned merchandise due to damage, seasonal inventory, restock, salvage recalls and excess inventory, as well as packaging and shipping materials from the end user or reseller. It also includes recycling programs, hazardous material programs, obsolete equipment disposition, and asset recovery [1]. Returned items could either be return to the vendor, resell as it is or reconditioned to discount store or to a broker, donated for charity and earn some tax deduction for it or if the item is not usable anymore, it will end up at landfill or recycled.

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Reverse logistics is much more difficult to manage compared to forward logistics. Future sales for example can easily been forecast in forward logistics but its not the case for reverse logistics as it is an action initiated by the action of consumers or other supply chain members. Good reverse logistics program can be a differentiator and provides a means of gaining market advantage but unfortunately, few companies have formal strategies for managing product returns [2].

Firms often focused on forward logistics and as a result, they tend to overlook at the importance of reverse logistics activities. Management usually was so concerned with the inbound movement of material and product to ensure that they can deliver it efficiently within the required time frame and at the right cost, through their supply chain. As a result, firms did not acknowledge the importance of having a centralized return centers (CRC) to process return product and there is also a temptation to redirect reverse logistics personnel to the forward logistics function when the facility is experiencing high demand [3]. In addition, reverse logistics should be properly managed just as forward logistics because it is also a cost center to the company. Minahan [4] estimated that reverse logistics activities constitute between 3 to 4% of a company's total logistics cost. On the other hand, some forward thinking companies in industries such as electronic equipment, household appliances, automotive parts, pharmaceuticals and chemicals view reverse logistics as a significant source of untapped profitability [5], [2]. Company such as Estee Lauder for example has, after a very successful reverse logistics project created $250 million product line from its return goods flow. Similarly, Caterpillar investment in remanufacturing plant in Mississippi that disassembles and rebuilds diesel engines pays off when the division has become their fastest growing unit with annual revenue tops $1 billion and is estimated to grow 20% a year [2].

One of the new challenges faced by Malaysian firms that want to go global is the fact that many countries have introduced legislation or directives to ensure effective disposal of manufactured products and its waste. Furthermore, the increase in awareness on environmental issues and the benefit of recycling had also placed more pressure on firms to create a better reverse logistics strategy. As an example, this is evidence in Europe where a new regulation with the objective to reduce the amount of waste dumped in landfills results in all manufacturers, wholesalers and retailers all came under the Waste Electrical and Electronic Equipment (WEEE) Directive

in January 2007. Under the terms of the regulations, manufacturers had to join a WEEE compliance scheme by March 2007, and as of July 2007 had full financial responsibility for recycling household equipment. As a result, the ability to manage the reverse logistics process efficiently will definitely become one of the critical factors for manufacturers and retailers who currently doing business or those who is thinking of going into Europe during the next couple of years [6]. Firms that comply with regulations and stress on environmental protection will have a good goodwill or corporate citizenship among their customers.

Besides managing product disposal, another activities involved in firm's reverse logistics system is the management of after-sales service, which is also a part of customer relationship management (CRM). A product is returned by a customer maybe because it is defective, did not as advertised, in wrong size or perhaps because the customer suddenly changed minds and decided that they did not need the thing after all [7]. Proper after-sales service may helps to enhance customer's loyalty and at the same time might improve firm's competitive advantage. According to Gentry [8], overall customers returns are estimated at 6% of sales and may run as high as 15% for mass merchandisers and up to 35% for catalog and e-commerce retailers. However, most of the business organizations are not aware about the after-sales service factors and its impact towards the customer satisfaction. Failing to realize the importance of the factors can lead to a disastrous and threatening business relationship. Dissatisfied customers will turn to competitors who can offer better after-sales services [9]. The objective of this paper is to investigate the current state or level of reverse logistics adoption by Malaysian manufacturers, the reverse logistics activities performed and the strategic benefits of adopting reverse logistics. Another focus is on the barriers faced by companies to implement reverse logistics initiative in their operation.

II. REVERSE LOGISTICS

Reverse logistics is the process of moving returned goods from their consumer destination for the purpose of capturing value or proper disposal. It includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls and excess inventory, as well as packaging and shipping materials from the end user or reseller [7]. Reverse logistics is caused by various reasons: defective products, wrong size, wrong components, lack of security features etc [7]. Notwithstanding the reasons, reverse logistics has a significant impact to many of the supply chain members such as supplier, manufacturer, third party logistics, wholesaler, retailer and (end) customer.

The reverse logistics system contains inputs, processes, structure and output [10] with integration of various broad factors e.g. demand, package, product conditions, test, repair, secondary market, vendor, charity giving, recycle and disposal [11]. Keeping the cost of reverse logistics to a minimum is a significant challenge. Examination of the literature depicted that there are four major drivers for the use of reverse logistics, which is economic, corporate citizenship and legislation. Economic forces includes financial consideration (minimize cost, improve profitability) and the pressure of competitors. Corporate citizenship refers to the search for sustainable development from an environment and social point of view, while legislation refers to norms imposed by any jurisdiction which dictate the legal obligations of a firm [12]. Environmental pressures across the globe have led to the development of legislation and regulations that place the onus on consumers as well as manufacturers to collect used products, and facilitate the disassembly of these products into their constituent parts and then distribute these for reuse, recycling, or safe disposal. The remanufacturing of used products has become accepted and identified as an advantage for many corporations and precludes the wasteful and environmentally damaging option of sending such goods to landfill or incineration [13].

The fact that consumers nowadays are becoming very demanding also places more pressure on firms to improve their reverse logistics activities. This is evidence through the survey conducted by Harris Interactive survey, which indicates that 90 percent of respondents state that it is important to their purchasing decisions that the retailers offer a convenient return policy and process [14]. In terms of reverse logistics performance, there are four measures that can be used namely improved profitability, improve customer relations, regulatory compliance and improve goodwill [15]. Just like forward logistics, proper management of reverse logistics could help firms improve their competitive advantage [2]. Aghazadeh [13] has found that despite the additional costs of waste transportation and third-party "demanufacturing", the process can provide companies, such as Dell and IBM, with a competitive advantage. Some manufacturers are already implementing reverse logistics and it not only helps to reduce costs, but at the same time gain a financial return on the process through the sale of refurbished goods, as well as capitalizing on their "green" credentials in marketing terms.

The indicators of a successful competitive strategy are market share, profitability, customer satisfaction and loyalty. Market share is best viewed as an outcome of strategic moves, and a measure of success, and not an intrinsically valuable asset to be bought or sold. Profitability is the reward from past advantages after the current outlays needed to sustain or enhance future advantages have been made [16]. Both mechanisms are operating concurrently and it is most accurate to think that both share and profitability as manifestation of superior assets, capabilities and strategic direction. Finally, there are also a number of barriers to successful reverse logistics such as treating reverse logistics as less important relative to other issues, company policies, lack of systems, financial resources, personnel resources and legal issues [3].

III. RESEARCH METHODOLOGY

Data for empirical analysis were collected via self-administered survey questionnaire. Population of the study is all manufacturing companies located at the three northern state of Malaysia, which are Penang, Kedah and Perlis, together with companies located in the Klang Valley, namely Kuala Lumpur and Selangor. The sampling frame used for this study is the Federation of Malaysian Manufacturers (FMM) Directory for the year 2010. A questionnaire was developed and in total, 500 survey questionnaires were distributed either via self-administered, regular mail or through email. 104 surveys were returned and after the initial inspection, only 101 are usable, making the overall response rate of 20.2 %. The data was than analyzed using SPSS 16 software in order to obtain the result.

IV. FINDINGS

Table 1 to 4 shows the demographic information of all manufacturers that take part in this study. Out of 101 manufacturers, 43 companies are fully owned by a foreign company or 42.6%, while 33 firms or 32.7% are a local company with no foreign shares at all. Another 10 (9.9%) and 12 (11.9%) have foreign ownership of 1 to 50% and 52 to 99% respectively. 31 companies have been in operation for more than 25 years or 30.7%. Second is in between 6 to 10 years with 28 (27.7%) companies and third is 16 to 20 years with 24 (23.8%) companies. Majority of respondents have more than 301 employees, as a total of 64 manufacturers are in this category while 42 of them employ more than 500 employees. 37 manufacturers in total have less than 300 employees and 23 employs less than 100 people.

In terms of annual turnover, more than half earn more than RM 20 million annually or over 62% of the respondents. Even 55 of them earned more than RM 40 million a year. Another 37 manufacturers earned less than RM 20 million where 4 earned less than a million in revenue. In order to measure the level of reverse logistics adoption, four measures were used, namely the financial investment, resource allocation, management commitment and overall involvement towards reverse logistics activities. Three out of these four indicators as depicted in table 5 scores a mean value of less than 3.0 (average), which is financial investment, resource allocation and overall involvement. Only mean scores for management commitment is more than the average, which is 3.12. Overall mean for reverse logistics level is 2.67.

TABLE 1
FOREIGN OWNERSHIP

	Frequency	Percent	Valid Percent
None	33	32.7	33.7
1 - 50%	10	9.9	10.2
52 - 99%	12	11.9	12.2
100%	43	42.6	43.9
Total	98	97.0	100.0
Missing	3	3.0	
Total	101	100.0	

TABLE 2
YEARS OF OPERATIONS

	Frequency	Percent	Valid Percent
< 5 years	6	5.9	5.9
6 - 10 years	28	27.7	27.7
11 - 15 years	6	5.9	5.9
16 - 20 years	24	23.8	23.8
21 - 25 years	6	5.9	5.9
> 25 years	31	30.7	30.7
Total	101	100.0	100.0

TABLE 3
NUMBER OF EMPLOYEES

	Frequency	Percent	Valid Percent
< 100	23	22.8	22.8
101 - 200	7	6.9	6.9
201 - 300	7	6.9	6.9
301 - 400	17	16.8	16.8
401 - 500	5	5.0	5.0
> 500	42	41.6	41.6
Total	101	100.0	100.0

TABLE 4
ANNUAL TURNOVER

	Frequency	Percent	Valid Percent
< 1 mil	4	4.0	4.0
1 - 10 mil	17	16.8	16.8
10.1 - 20 mil	16	15.8	15.8
20.1 - 30 mil	3	3.0	3.0
30.1 - 40 mil	6	5.9	5.9
> 40 mil	55	54.5	54.5
Total	101	100.0	100.0

TABLE 5
LEVEL OF RL ADOPTION

	N	Mean	Std. Deviation
Financial investment in RL	100	2.36	1.168
Resources allocated for RL	100	2.35	1.104
Mgmt Commitment in RL	100	3.12	1.249
Overall involvement in RL	101	2.74	1.180

There are various reverse logistics activities conducted by the manufacturers based on their respond. Table 6 shows that receiving return products are the reverse logistics activities conducted by most number of firms, which are 85 manufacturers. This is followed by product

TABLE 6
RL ACTIVITIES

	Frequency	Percent
Receiving returns	85	84.2
Recondition/Refurbish	28	27.7
Recycling/Material Reclaim	23	22.8
Salvage	14	13.9
Remanufacturing	15	14.9
Discount/Outlet sales	8	7.9

reconditioning/refurbishing with 28 manufacturers and recycling/material reclaimed with 23 manufacturers. Product salvage, remanufacturing and product resold to discount or outlet stores for sale are conducted by 14, 15 and 8 manufacturers respectively.

Reverse logistics deals with product returns and it is important to understand the reason for it. Table 7 indicates that quality issues top the list of reasons for product return with 74 manufacturers, while defective product come second as 63 manufacturers select this reason. Third is damaged product with 42 manufacturers, followed by wrong delivery 28, wrong size/dimension 22, wrong quantity 16 and obsolete product 11.

TABLE 7
REASONS FOR RETURN

	Frequency	Percent
Defective Product	63	62.4
Obsolete Product	11	10.9
Wrong Quantity	16	15.8
Wrong Size/Dimension	22	21.8
Damage Product	42	41.6
Wrong goods delivered	28	27.7
Quality issues	74	73.3

Upon receipt of returned products, 42 manufacturers said that they returned the goods back to supplier or other manufacturer, remanufactured into a new product 36, reconditioned 33, or disposed at landfill 27 as depicted in table 8. 21 manufacturers even repackaged the product and sold it again. Other actions include salvaged 17, recycled 16, rework/repair 11, resold to discount stores 8 and donated 3 manufacturers.

TABLE 8
WHAT WAS DONE TO RETURN GOODS

	Frequency	Percent
Returned to supplier/ manufacturer	42	41.6
Recycled	16	15.8
Resold to discount store	8	7.9
Remanufactured	36	35.6
Donated	3	3.0
Disposed at landfill	27	26.7
Repackaged and sold	21	20.8
Reconditioned	33	32.7
Salvage	17	16.8
Rework/repair	11	10.9
Others	5	5

Adoption of reverse logistics according to the respondents brings various benefits. 71 manufacturers state that it helps them create a new improved product while 57 said that it can improve the customer relations, as shown in table 9. Enhance firm's competitiveness and firm's credibility/prestige is the benefits cited by 51 and 48 firms respectively. Catch up with competitors (34 manufacturers) and quickly respond to change (33 manufacturers) are the final two benefits of reverse logistics.

TABLE 9
BENEFITS OF REVERSE LOGISTICS

	Frequency	Percent
New/Improved product	71	70.3
Enhance competitiveness	51	50.5
Catch up with competitors	34	33.7
Improve customer relations	57	56.4
Enhance credibility/prestige	48	47.5
Quickly respond to change	33	32.7

Last part of the survey requires respondents to rate the barriers to optimal reverse logistics adoption. Outcome of the analysis was available in table 10. Lack of awareness and lack of knowledge on the importance and benefit of reverse logistics scores the highest mean of 3.51, followed by the perception that the costs of adopting reverse logistics are high with a mean score of 3.47. Lack of resources and no support from the management of the company complete the top 4 list with mean of 3.39 and 3.17 respectively. Respondents however did not agree with three other statements which are reverse logistics is not an important issue to the company, it is company policy not to accept return products and reverse logistics brings no benefit to the company as the mean score is less than 3.0.

TABLE 10
BARRIERS TO ADOPTION

	N	Mean	Std. Deviation
Lack awareness/knowledge	101	3.51	.901
Cost is high	101	3.47	.901
Lack resources	101	3.39	.848
No support from management	101	3.17	1.184
Un-important issue to company	101	2.93	1.079
Policy not to accept returns	101	2.51	1.036
No benefit to the company	101	2.55	1.053

V. Discussions, Conclusions and Directions for Future Research

This study involves 101 manufacturers in Malaysia from diverse demographic background. Upon analysis, the data shows that all companies involved in this study do implement various reverse logistics activities from the simplest initiative such as receiving returned product from buyers to a more advance activities such as reconditioning or recycling (material reclaim). There are many reasons stated for product returned and among the most cited reasons are the product did not met the required quality standard, defective or the product are damaged. Most of the returned product based on the respond given was then either returned to the supplier or original manufacturer, or it is remanufactured into a new product. Some returned product may also be reconditioned and sold as a second-hand (used) product. Manufacturers also recycle and salvage the component or parts from the returned product and re-used it during the production of another product.

The level of reverse logistics adoption among Malaysian manufacturers however is still low with a mean score of 2.67. An item by item analysis shows that the level of investment, resources and overall commitment towards reverse logistics are less than average. It shows that firms are not really ready to commit themselves towards investing and allocating extra resources for reverse logistics adoption. Even the score for commitment by the management shows just a slightly higher than average score. The reason for this low level of reverse logistics adoption can be associated with the barriers to adoption question, where lack of awareness or knowledge on reverse logistics scores the highest among all the other barriers. Furthermore, manufacturers have the perception that reverse logistics require a huge investment and high number of resources. It seems that manufacturers are not ready to invest and allocate resources even though the management of the company is aware of the benefit of adopting reverse logistics. Reverse logistics adoption is expected to help firms create new or even improved their current product, improve the relationships with its customers and enhance firm's competitive advantage. It is also important nowadays for manufacturers to enhance its corporate social responsibility and reverse logistics is one of the best ways to enhance their credibility and prestige in the eyes of the customer.

As a conclusion, findings of this study have indicated that reverse logistics adoption among Malaysian manufacturers, especially those located in the Northern part of Malaysia and the Klang Valley is still low. This is mainly due to the lack of awareness or knowledge on the reverse logistics concept. Although management of the company realizes the benefit of reverse logistics, the level of investment, resource allocation and commitment towards it is still less than average. The most popular reverse logistics activities conducted by the respondents is receiving returned product from customers, while the number of manufacturers that conducted the other activities such as remanufacturing, reconditioning, repackaging and even recycling are relatively small.

This study contributes in a way that it shed a light on the current, below than average level of reverse logistics adoption among Malaysian manufacturers. It also provides the important information for manufacturers, government agencies, policy makers, managers and researchers by highlighting a number of key issues that hinder the implementation of reverse logistics activities among manufacturers. This study is also important because it represents an attempt to identify the reverse logistics activities that have been implemented by manufacturers and which one is not. Furthermore, it highlights the most important benefits enjoyed by those firms that have implemented reverse logistics in their operations. This hopefully will encourage manufacturers that have yet to implement reverse logistics activities to seriously consider it as it can help improve their competitiveness and enhance customer service and relationships.

Finally, there are many possibilities for further research in reverse logistics adoption. Future study may consider investigating the state of adoption within different manufacturing industries as this study look at the overall manufacturing sector. It is expected that reverse logistics implementation level might depends on the industries that each manufacturing entities are in. Moreover, it would be a good idea to investigate the influences of various factors such as government regulations, environmental awareness or any other factors either as independent or moderating/mediating variables that can influence manufacturer's decision in adopting reverse logistics activities.

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